IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: John Moon	Art Unit: 1797
Serial No.: 10/661,836	Examiner: Hyun, Paul Sang Hwa
Filed: September 12, 2003	
For: METHOD AND APPARATUS FOR ALIGNING MICROBEADS IN ORDER TO INTERROGATE THE SAME	

AMENDMENT AFTER FINAL

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In response to the final Office Action dated February 26, 2008, Applicant respectfully requests consideration and entry of the following amendment:

EXHIBIT B

IN THE CLAIMS:

1. (Currently Amended) A method for aligning microbeads to be read by a code reading or other detection device, comprising:

providing microbeads to a positioning device, each microbead having an elongated body with a holographic code disposed thereon or therein, the code being oriented to extend along a longitudinal axis of the corresponding microbead and being defined at least in part by variation of a refractive index of the microbead, the refractive index varying in an axial direction along the longitudinal axis of the microbead; and

aligning the microbeads with the positioning device so the codes, the variation in the refractive index of the codes, and the longitudinal axis of the microbeads are in a common fixed orientation relative to the code reading or other detection device.

2. (Previously Presented) A method according to claim 1, wherein the positioning device includes a plate having a multiplicity of grooves therein, the microbeads being aligned in the grooves such that the longitudinal axis of the microbeads extends along a length of the corresponding groove.

3. (Previously Presented) A method according to claim 2, wherein the method includes agitating the plate to encourage alignment of the microbeads into the grooves.

4. (Previously Presented) A method according to claim 1, wherein the microbeads are tubularly shaped with a length extending along the longitudinal axis and with a circular diameter traversing the longitudinal axis, the length being greater than the diameter.

5. (Previously Presented) A method according to claim 1, wherein the microbeads have the holographic code embedded in a central region thereof.

6. (Original) A method according to claim 1, wherein the code is used to correlate a chemical content on each bead with a measured fluorescence signal.

7. (Previously Presented) A method according to claim 1, wherein the elongated body has opposite ends arranged along the longitudinal axis and sides located transversely with respect to the longitudinal axis, the positioning device holding each microbead in a substantially known fixed orientation and alignment in relation to an end to end pitch direction and a side to side yaw direction while permitting the microbeads to rotate in a roll direction about the longitudinal axis.

8. (Previously Presented) A method according to claim 2, wherein the plate has a series of parallel grooves having one of a square shape, a rectangular shape, v-shape and semi-circular shape.

9. (Previously Presented) A method according to claim 2, wherein the plate is an optically transparent medium including boro-silicate glass, fused silica or plastic, and the grooves are open sided.

10. (Previously Presented) A method according to claim 2, wherein the microbeads have a tubular shape with a circular cross-section and are positioned end to end in the grooves, the grooves having an open side with a depth that is dimensioned to be at least a diameter of the microbeads.

11. (Previously Presented) A method according to claim 2, wherein the microbeads have a circular dimension and either the grooves have a depth between 10 and 125 microns, the depth is dimensioned within 90% of the diameter of the microbeads, or a combination thereof.

12. (Previously Presented) A method according to claim 2, wherein the microbeads have a circular dimension and a spacing of the grooves is between 1 and 2 times the diameter of the microbeads.

13. (Previously Presented) A method according to claim 2, wherein the grooves have an open side and the microbeads, when introduced, are free to move across a side of the plate until aligning with and coming to rest in the grooves.

14. (Previously Presented) A method according to claim 2, wherein the microbeads have a tubular shape and the grooves are arranged in one of rows, concentric circles and spirals.

15. (Previously Presented) A method according to claim 2, wherein the grooves have a bottom that is flat enough to prevent the beads from rotating, by more than a few tenths of a degree, relative to the code reader device.

16. (Original) A method according to claim 1, wherein the code reader device includes a readout camera.

17. (Previously Presented) A method according to claim 2, further comprising agitating the plate using a sonic transducer, a mechanical wipe, or shaking or rocking device.

18. (Withdrawn) A method according to claim 1, wherein the method includes using an open format approach by dispensing the microbeads onto the plate using a pipette tip or syringe tip and not covering the plate.

19. (Previously Presented) A method according to claim 1, further comprising dispensing the microbeads into a cuvette-like device comprising a plate, at least three walls and a cover.

20. (Previously Presented) A method according to claim 19, wherein the step of dispensing includes injecting the microbeads near an edge of an opening into the cuvette-like device and allowing surface tension, or an induced fluid flow, to pull the microbeads into the cuvette-like device.

21. (Previously Presented) A method according to claim 19, wherein the method includes using a closed format approach by sectioning a closed region into two regions, a first region where the microbeads are free to move about in a plane, either in a groove or not, and a second region where the microbeads are trapped in a groove and can only move along an axis of the groove.

22. (Original) A method according to claim 21, wherein the method includes the step of trapping the microbeads in a groove by reducing the height of the closed region so that the microbeads can no longer come out of the groove.

23. (Original) A method according to claim 21, wherein the first region is used to pre-align the beads into a groove, facilitating the introduction of beads into the second region.

24. (Previously Presented) A method according to claim 21, wherein the method includes tilting the cuvette-like device up so gravity can be used to pull the microbeads along a groove from the first region to the second region.

25. (Original) A method according to claim 21, wherein the plate is made of silicon having walls formed by Su8 coupled thereto, or having walls formed by etching the silicon.

26. (Original) A method according to claim 1, wherein the method includes the step of identifying a chemical content on the surface of the microbead with a measured fluorescence signal.

27. (Original) A method according to claim 1, wherein the method includes passing a code reading signal through the microbead aligned on the positioning device.

28. (Original) A method according to claim 1, wherein the method further includes the step of correlating a chemical content identified on each microbead with a fluorescence signal, including one provided by an incident laser beam device.

29. (Original) A method according to claim 1, wherein the method includes the step of identifying the code in the microbead.

30. (Previously Presented) A method according to claim 2, wherein the grooves of the plate are formed using a photo lithographic process.

31. (Previously Presented) A method according to claim 2, wherein the plate includes a glass plate having Su8 thereon.

32. (Previously Presented) A method according to claim 31, wherein the glass plate is a low fluorescence glass.

33. (Withdrawn) A method according to claim 1, wherein the glass plate is a boro silicate glass.

34. (Previously Presented) A method according to claim 2, wherein the grooves on the plate are mechanically machined.

35. (Withdrawn) A method according to claim 1, wherein the grooves on the plate are formed by deep reactive ion etching.

36. (Withdrawn) A method according to claim 1, wherein the grooves on the plate are formed by injection molding.

37. (Original) A method according to claim 2, wherein the plate has a mirror coating.

38. (Original) A method according to claim 2, wherein the plate is a disk having circumferential grooves, concentric grooves, or a combination thereof.

39. (Withdrawn) A method according to claim 2, wherein the plate is a disk having radial grooves.

40. (Original) A method according to claim 2, wherein the plate is a disk having a microbead loading area located in the center of the disk.

41. (Original) A method according to claim 2, wherein the plate is a disk having one or more radial water channels extending from the center to the outer periphery thereof.

42. (Original) A method according to claim 2, wherein the method includes arranging the plate on a rotating disk.

43. (Withdrawn) A method according to claim 1, wherein the positioning device is a flow tube.

44. (Withdrawn) A method according to claim 43, wherein the step of providing includes providing the microbeads to the flow tube in a fluid.

45. (Previously Presented) A method according to claim 1, wherein the positioning device comprises a plurality of holes that receive the microbeads.

46. (Original) A method according to claim 1, wherein the microbeads have teeth or protrusions thereon.

47-57. (Cancelled)

58. (Currently Amended) A method for aligning microbeads to be read by a code reading or other detection device, comprising:

providing microbeads to a positioning device, wherein the positioning device comprises a groove plate with a side having a multiplicity of grooves therein to receive the microbeads, each microbead having an elongated body with a code disposed thereon or therein, the code being oriented to extend along a longitudinal axis of the corresponding microbead and being defined at least in part by variation of a refractive index of the microbead, the refractive index varying in an axial direction along the longitudinal axis of the microbead;

causing the microbeads to flow freely across the side of the groove plate; and

aligning the microbeads with the positioning device by moving the groove plate to cause at least a portion of the microbeads to align within the grooves so the codes, the variation in the refractive index of the codes, and the longitudinal axis of the microbeads are in a fixed orientation relative to the code reading or other detection device.

59. (Cancelled)

60. (Previously Presented) A method according to claim 58, wherein the holographic code comprise a numeric code formed from a series of bits arranged proximate one another along the longitudinal axis of the microbead, each of the bits being assigned one of at least two values.

61. (New) A method according to claim 58, wherein the positioning device includes a plate having a multiplicity of grooves therein, the microbeads being aligned in the grooves such that the longitudinal axis of the microbeads extends along a length of the corresponding groove.

62. (New) A method according to claim 58, wherein the microbeads are tubularly shaped with a length extending along the longitudinal axis and with a circular diameter traversing the longitudinal axis, the length being greater than the diameter.

63. (New) A method according to claim 58, wherein the elongated body has opposite ends arranged along the longitudinal axis and sides located transversely with respect to the longitudinal axis, the positioning device holding each microbead in a substantially known fixed orientation and alignment in relation to an end to end pitch direction and a side to side yaw direction while permitting the microbeads to rotate in a roll direction about the longitudinal axis.

64. (New) A method according to claim 61, wherein the plate is an optically transparent medium including boro-silicate glass, fused silica or plastic, and the grooves are open sided.

65. (New) A method according to claim 61, wherein the microbeads have a tubular shape with a circular cross-section and are positioned end to end in the grooves, the grooves having an open side with a depth that is dimensioned to be at least a diameter of the microbeads.

66. (New) A method according to claim 61, wherein the microbeads have a circular dimension and either the grooves have a depth between 10 and 125 microns, the depth is dimensioned within 90% of the diameter of the microbeads, or a combination thereof.

67. (New) A method according to claim 61, wherein the microbeads have a circular dimension and a spacing of the grooves is between 1 and 2 times the diameter of the microbeads.

68. (New) A method according to claim 61, wherein the grooves have a bottom that is flat enough to prevent the beads from rotating, by more than a few tenths of a degree, relative to the code reader device.

69. (New) A method according to claim 58, wherein the method includes the step of identifying a chemical content on the surface of the microbead with a measured fluorescence signal.

70. (New) A method according to claim 58, wherein the method includes passing a code reading signal through the microbead aligned on the positioning device.

71. (New) A method according to claim 58, wherein the method further includes the step of correlating a chemical content identified on each microbead with a fluorescence signal, including one provided by an incident laser beam device.

72. (New) A method according to claim 58, wherein the method includes the step of identifying the code in the microbead.

REMARKS

Claims 1-53 and 58-60 were pending in the present application, from which claims 18, 33, 35, 36, 39, 43, 44 and 52-57 have been withdrawn from consideration. By this amendment, claims 47-53 have been cancelled and new claims 61-72 have been added. It is respectfully submitted that the pending claims define allowable subject matter.

Initially, the undersigned would like to thank the Examiner for speaking with him regarding the present application on March 26, 2008. As discussed during the phone call, the Applicant would like to amend the independent claims 1 and 58 to include the subject matter of claim 59. Claim 59 is dependent upon claim 1 and was indicated as containing allowable subject matter in the Office Action. The Examiner believed that there would be no objection to amending claim 58 to include the subject matter of claim 59.

Regarding the provisional obviousness-type double patenting rejections, it is believed that the claim limitations added with this Amendment are patentably distinct from the claims of the co-pending application Nos. 11/063,665 and 11/226,892. Applicant reserves the right to file a terminal disclaimer at a later time should it be desirable to do so to expedite prosecution.

Regarding the Section 112, first paragraph, rejection of claim 46, Applicant submits that the claimed subject matter is described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. More specifically, the Application supports a microbead that includes both holographic codes and protrusions. As described in the Application, the microbead includes an optically readable code. (See, for example, page 9 at line 14 through page 10, line 10). Figures 39-50 describe alternative geometries of the microbead. (page 35, line 12). In particular, Figure 47 illustrates that the microbead "may have one or more protruding portions or teeth...." (page 38, lines 15-16). Thus, Applicant respectfully requests that the Section 112 rejection of claim 46 be withdrawn.

Turning to the substantive rejections, claims 47, 50, and 51 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Empedocles et al (US 2002/0031783). Claims 47-49 have been rejected under 35 U.S.C. § 102(e) as being anticipated by

Boulton et al (USP 6,027,694). Claims 1, 4-7, 16, 26-29, and 58 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Empedocles in view of Ravkin (USP 6,908,737). Claims 2, 3, 8-15, 17, 30, 34, 42, and 45 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Empedocles in view of Ravkin and further in view of Pope (US 2002/0197456). Claims 19-25, 31, 32, and 37 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Empedocles in view of Ravkin and further in view of Seul et al. (US 2003/0082587). Claims 38, 40, and 41 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Empedocles in view of Ravkin and further in view of Phan et al. (US 2003/0082568). Claim 60 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Empedocles in view of Ravkin and further in view of Barlow et al. (USP 5,682,244).

As indicated above, in order to expedite prosecution of the application, the subject matter of claim 59 has been incorporated into independent claims 1 and 58. Thus, the Section 102 and 103 rejections are respectfully traversed.

In view of the foregoing comments, it is respectfully submitted that the applied references fail to teach or suggest the claimed invention. Should anything remain in order to place the present application in condition for allowance, the Examiner is kindly invited to contact the undersigned at the telephone number listed below.

Respectfully Submitted,

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